

***Semidelitschia nanostellata* (Fungi: Dothideales: Sporormiaceae): A New Species From Australia**

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Abstract

A new species *Semidelitschia nanostellata* is described from Red-necked Wallaby (*Macropus rufogriseus*) dung collected in southwest Tasmania. The most distinctive character of this species is the presence of small star-like appendages at the base of the asci which firmly secure the asci to cells at the base of the centrum.

Introduction

The new species of coprophilous Ascomycete belongs to the genus *Semidelitschia*. It was obtained from Red-necked Wallaby (*Macropus rufogriseus*) dung collected from the eastern shore of Bathurst Harbour, southwest Tasmania.

Materials and Methods

The dried dung was first thoroughly soaked in sterile distilled water and then incubated on moist filter paper in a glass (lidded) container (Bell 1999). Most observations of the fungus were made in water mounts in order to study its features in their natural state. In addition, samples were mounted in congo red (a 1% aqueous solution) or lactophenol cotton blue (20 g phenol, 20 g lactic acid, 40 g glycerol, 0.05 g cotton blue, 20 g water). A number of semi-permanent slides were made using Shear's mounting medium (see Bell 1999 for recipe). The ascospore size range was determined by measuring 50 ascospores from the fresh material. A small portion of dung containing perithecia of the fungus was air dried for incorporation at The National Herbarium of Victoria (MEL).

Germination of ascospores was attempted. Mature ascospores were spread across the surface of corn meal agar (CMA) either immediately or following surface sterilization of mature perithecia in a 3% solution of hydrogen peroxide for 25–30 min. In another attempt the same 3% hydrogen peroxide treatment was followed by perithecial transfer to a drop of 10% buffered (pH 6.8) pancreatin and incubation at 37° C for 3 h (see Lundqvist et al. 1999). This technique attempts to simulate conditions in an animal's gut which are thought to trigger spore germination. Hydrogen peroxide treated ascospores were also spread on to CMA containing 7g/L sodium acetate or were transferred to sterile water and heated at 60° C for 30 min before spreading them over CMA lacking sodium acetate. All attempts to germinate ascospores have failed.

Taxonomy

Semidelitschia nanostellata Bell & Mahoney, sp. nov.

Perithecia aggregare, venter subterranea, globosa vel ovata, glabra, semicoreacea, nigra, 1 mm in diametro. Columni emersum, 1 mm, inferior nigro, hirsutum, superior hyalinus. Paraphyses filiformi-ventricosae, crassae. Asci cylindraceus, bitunicatis, 8-spori, inferior stellifera. Sporae biseratae vel uniseratae, eseptata, ellipsoidea vel subdepressa, atro-brunneae, 34–42(–46) × 19–22 µm. Tota spora tunica gelatinoso crassus in aqua inflatum.

Type: Australia, 10 m S of Bathurst Creek, E shore of Bathurst Harbour, Port Davey,

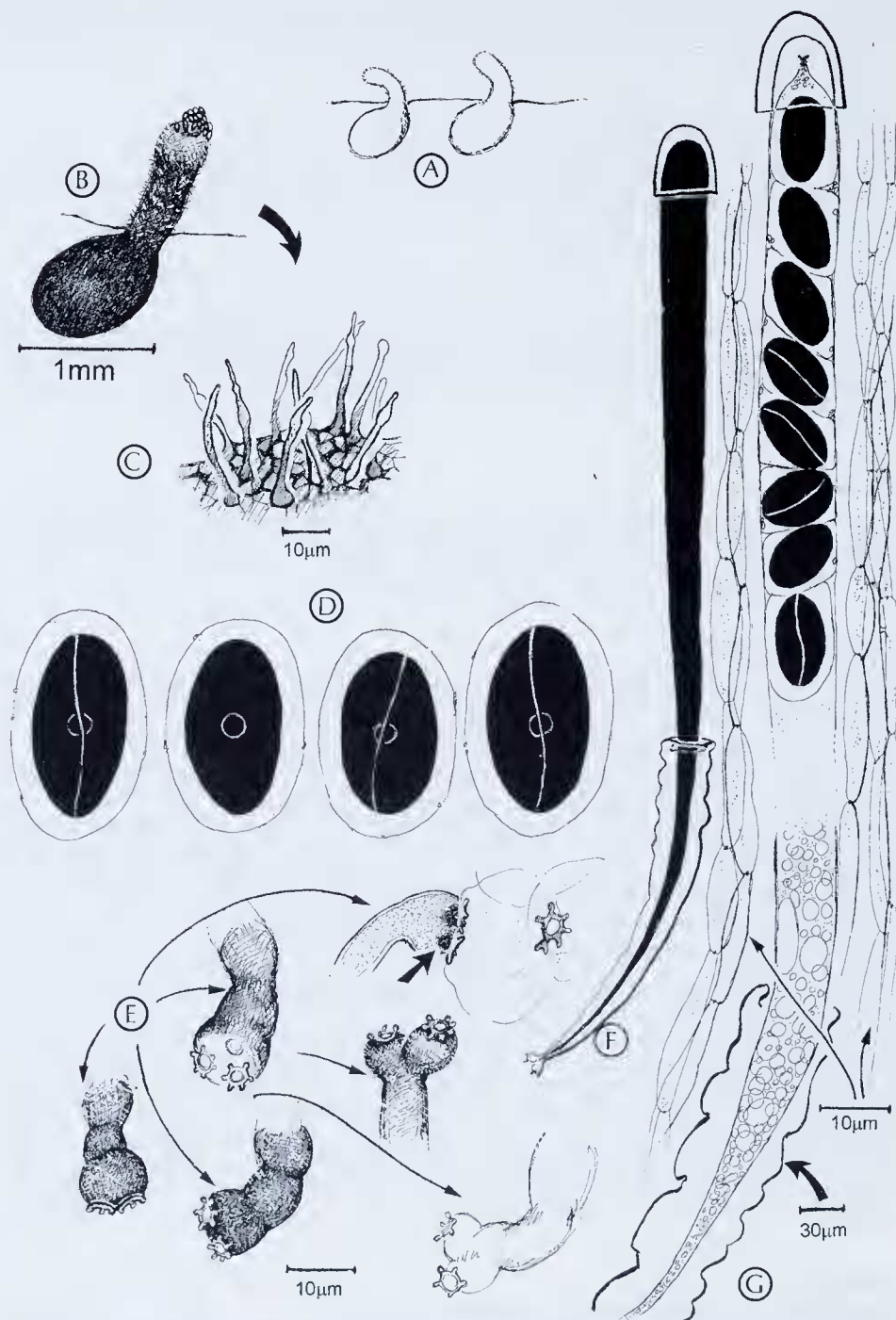


Figure 1. *Semidelitschia nanostellata*. A. Diagrammatic representation of perithecia on the dung. B. Habit of perithecium with cluster of released ascospores at the ostiole. C. Detail of perithecial neck hairs. D. Mature ascospores showing gelatinous sheaths, germination slits and nuclei. E. Star-shaped structures at the base of the asci (large arrow denotes stained material). F. Diagrammatic representation of dehiscent ascus. G. Mature ascus and paraphyses (note these are drawn to different scales).

SW Tasmania, lat. 43°21'46", long. 146°13'30"; substrate: dung of Red-necked Wallaby (*Macropus rufogriseus*), collected 12 April 1998, Janet Fenton (holotype MEL 2070230).

Characteristics on dung: *Perithecia* aggregated but not confluent, venters submerged beneath the dung surface (Fig. 1A & B). Venters spheroidal or somewhat ovoid, black, approximately 1 mm in diameter, smooth, somewhat coriaceous in texture, composed of angular pseudoparenchyma (=textura angularis). Necks often attached at an angle to the venters, approximately 1 mm long, emergent from the dung surface, lower portions black and minutely hairy with a distinctly hyaline pubescent tip. Neck hairs are approximately 20 µm in length, one or more cells long and brown for the most part with pale tips (Fig. 1C). Ripe discharged ascospores often congregated at ostiole (Fig. 1B). *Paraphyses* densely packed around asci, consisting of variously sized elongate cells which are indented at their septa. Some lateral connections observed between contiguous chains of cells (Fig. 1G). *Asci* bitunicate, cylindric, abruptly contracted below into a short stipe, approximately 300 × 45 µm in their non-dehiscent state, rapidly elongating in water mounts (Fig. 1F & G). Dehiscence of the outer ascus wall is by subapical rupture (Ainsworth & Bisby's *Dictionary of the Fungi* 1995, Fig. 1L). Inner ascus wall endowed with a thickened but otherwise apparently undifferentiated tip (Fig. 1G). The most distinctive feature of the ascus is the star-shaped structure (usually two) at the base of each ascus. These attach the asci firmly to the cells lining the centrum (Fig. 1E & F). As a consequence of these tiny structures, the asci are extremely resistant to separation from the basal cells. Each star-shaped structure is approximately 5 µm in diameter and composed of several blunt little arms radiating from a central disc. Staining with cotton blue reveals two densely staining areas of cytoplasm associated with each stellate structure, indicating a firm living connection with the cell beneath each ascus (Fig. 1E, large arrow). *Ascospores* 8 per ascus, initially biseriolate but becoming uniseriate in water mounts due to elongation of the asci, dark brown to black at maturity, smooth, ellipsoidal, equilateral or slightly inequilateral, 34–42(–46) × 19–22 µm with a straight or slightly sinuate germination slit extending along one side of the long axis of each ascospore. Each ascospore surrounded by a gelatinous sheath (Fig. 1D & G). Within the asci the compressed ascospore sheaths give a cellular appearance to the asci (Fig. 1G).

Etymology: *nano* = 'dwarf', *stellata* = 'star', referring to the structures at the base of the asci in this species.

Discussion

The genus *Semidelitschia* was erected by Cain and Luck-Allen (1969) on the basis of single-celled dark ascospores bearing germination slits. It differs from the genus *Delitschia* Auersw. which has dark two-celled ascospores. In their description of *S. agasmatica*, Cain and Luck-Allen make no mention of any unusual structures at the bases of the asci and, unfortunately, the accompanying drawing illustrates what appears to be an ascus broken off above its base. Ascospores of *S. agasmatica* are (52–)54–76 × (28–)34–40 µm and are significantly larger than those of the species described here. Cain and Luck-Allen list nine herbarium samples of *S. agasmatica* from cow, sheep and horse dung collected from temperate locations in North America.

The only other species described for this genus is *S. tetraspora* (Mirza & Khan 1979). Its description is brief. The authors were uncertain as to the bitunicate nature of the asci and make no reference to the bases of the asci. They give the ascospore measurements for *S. tetraspora* as 18–22 × 9–12 µm, and list one sample from goat dung collected in Pakistan. Neither *S. agasmatica* nor *S. tetraspora* have been grown in culture.

Semidelitschia is a genus rarely recorded by mycologists. Indeed this is the first time we have observed the genus after some 30+ years of studying dung fungi. We do not know if the stellate ascus bases are peculiar to our new species or whether they were

simply overlooked in the other two described species. We do know, however, that these ascus bases are also shared by a number of species in the genus *Sporormiella* (research in progress). Another characteristic in common with various species of *Sporormiella* is the hyaline upper portion of the perithecial neck (Fig. 1B). However, species of *Sporormiella* have multicelled ascospores.

Observations made here support Cain and Luck-Allen's placement of *Semidelitschia* in the Sporormiaceae.

Acknowledgements

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References

- Ainsworth & Bisby's *Dictionary of the Fungi*, 8th edition, (1995), by Hawksworth P.M., Kirk P.M., Sutton B.C. & Pegler D.N. Published by CAB International, 616 pp.
- Bell A. (1999). *Podospora petrogale* (Fungi: Sordariales: Lasiosphaeriaceae), a new species from Australia. *Muelleria* **12**, 235–240.
- Cain R.F. & Luck-Allen E.R. (1969). *Semidelitschia*, a new genus of the Sporormiaceae. *Mycologia* **61**, 580–585.
- Lundqvist N., Mahoney D.P., Bell A. & Lorenzo L.E. (1999). *Podospora austrohemisphaerica*, a new heterothallic ascomycete from dung. *Mycologia* **91**, 405–415.
- Mirza J.H. & Khan S.M. (1979). Studies on coprophilous Ascomycetes of Pakistan III: *Semidelitschia tetraspora* sp. nov. *Pakistan J. Bot.* **11**, 99–101.